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(54) **INFORMATION PROCESSING APPARATUS, INFORMATION PROCESSING METHOD AND COMPUTER PROGRAM PRODUCT**

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H04N 5/262	(2006.01)
H04N 5/232	(2006.01)
H04N 1/21	(2006.01)

(52) **U.S. Cl.**

CPC ***H04N 5/272*** (2013.01); ***H04N 5/23293*** (2013.01); ***H04N 5/2621*** (2013.01); *H04N 1/2112* (2013.01)

(58) **Field of Classification Search**

CPC . H04N 5/272; H04N 5/23293; H04N 5/2621; H04N 1/2112; G06F 17/30

USPC 348/231.2, 239

See application file for complete search history.

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(57) **ABSTRACT**

According to an embodiment, an information processing apparatus includes a first image acquisition unit, a first information acquisition unit, a reception unit, a generation unit, and a writing unit. The first image acquisition unit is configured to acquire a first image obtained by imaging by an imaging unit. The first information acquisition unit is configured to acquire any of multiple pieces of information capable of being associated with the first image. The reception unit is configured to receive a first input. The generation unit is configured to associate the first image acquired in the first image acquisition unit with the information piece acquired in the first information acquisition unit to generate an association data piece when the reception unit receives the first input. The writing unit is configured to write the association data piece into a storage unit.

15 Claims, 8 Drawing Sheets

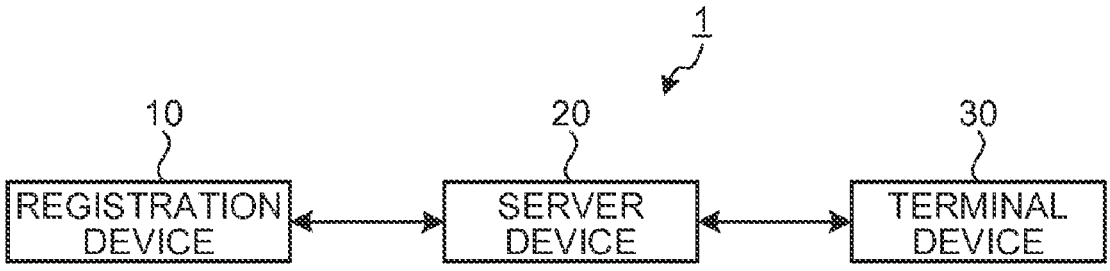


FIG.1

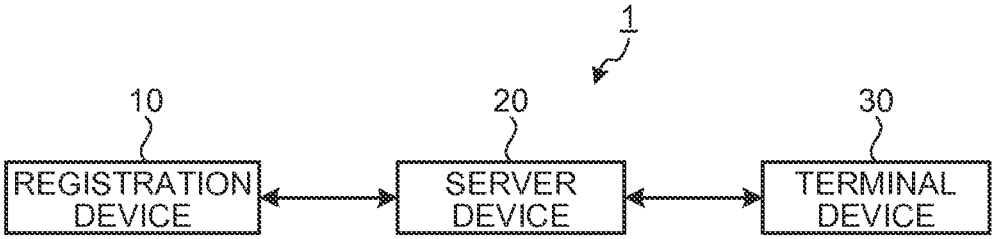

1
10
20
30
REGISTRATION DEVICE
SERVER DEVICE
TERMINAL DEVICE

FIG.2

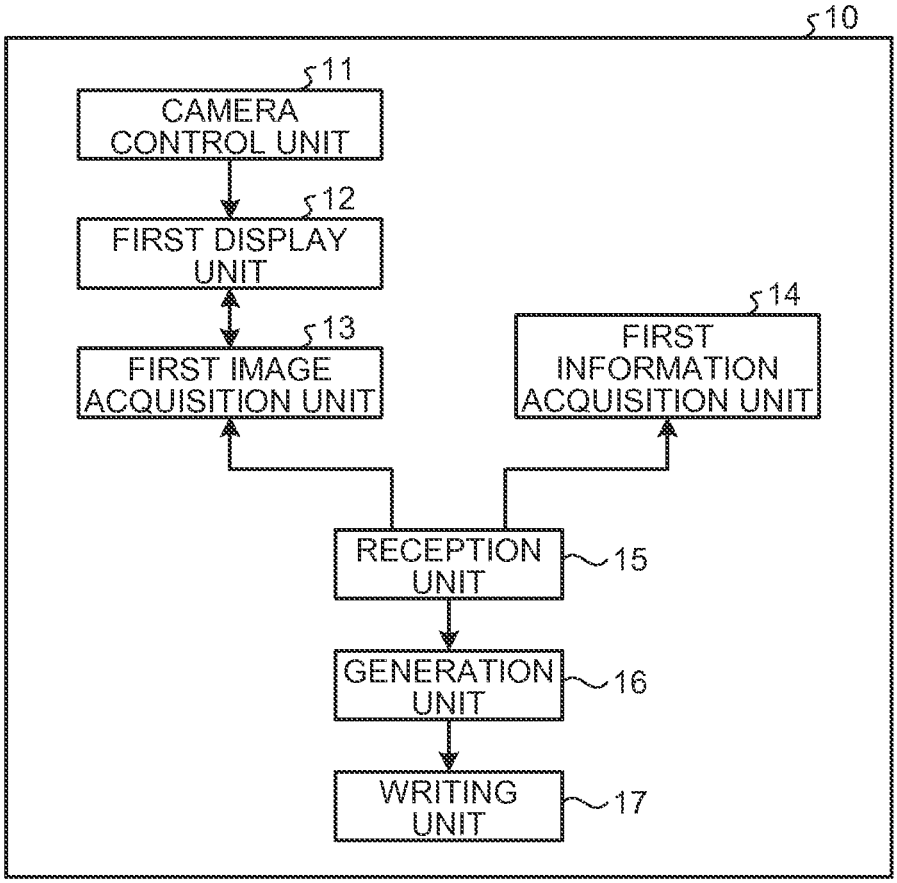

10
11
CAMERA CONTROL UNIT
12
FIRST DISPLAY UNIT
13
FIRST IMAGE ACQUISITION UNIT
14
FIRST INFORMATION ACQUISITION UNIT
RECEPTION UNIT
15
GENERATION UNIT
16
WRITING UNIT
17

FIG.3

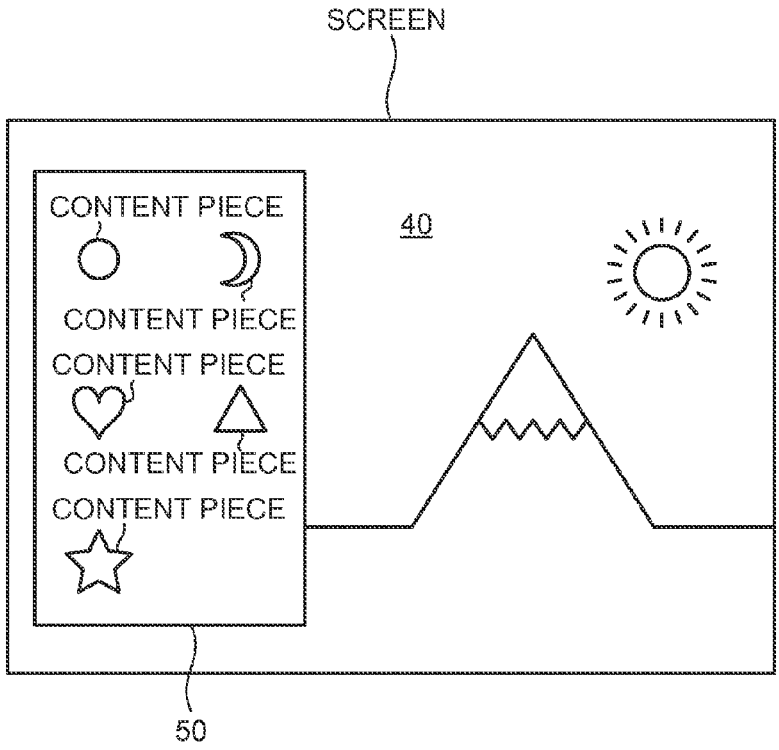

SCREEN
CONTENT PIECE
CONTENT PIECE
CONTENT PIECE
CONTENT PIECE
CONTENT PIECE
40
50

FIG.4

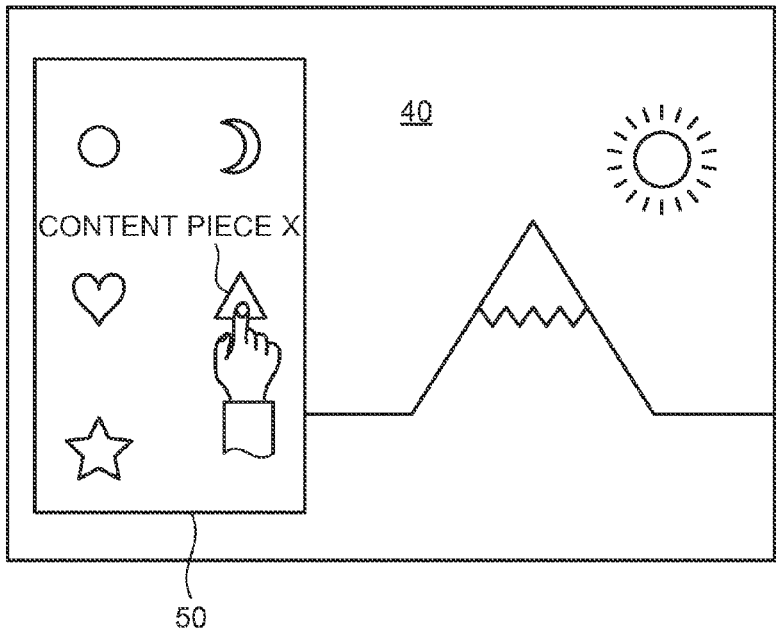

CONTENT PIECE X
40
50

FIG.5

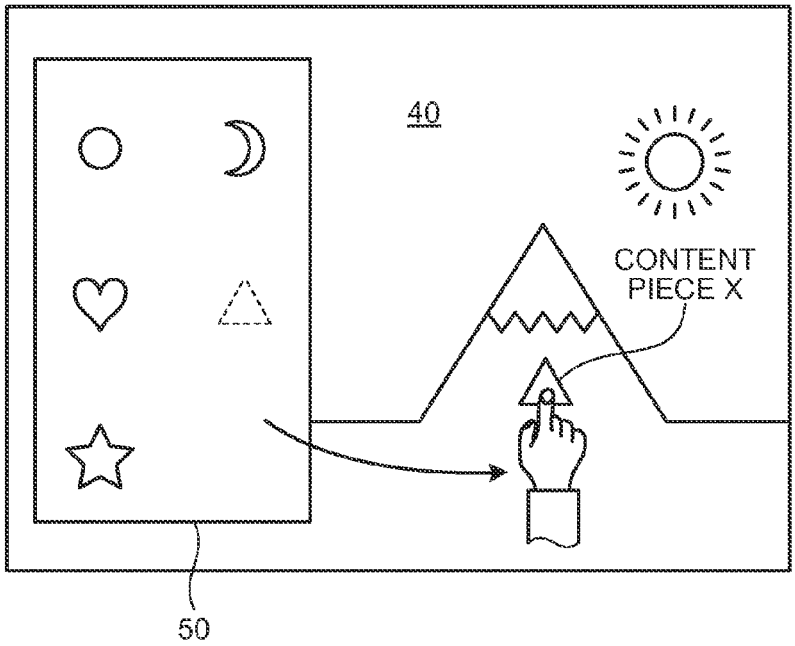

40
CONTENT PIECE X
50

FIG.6

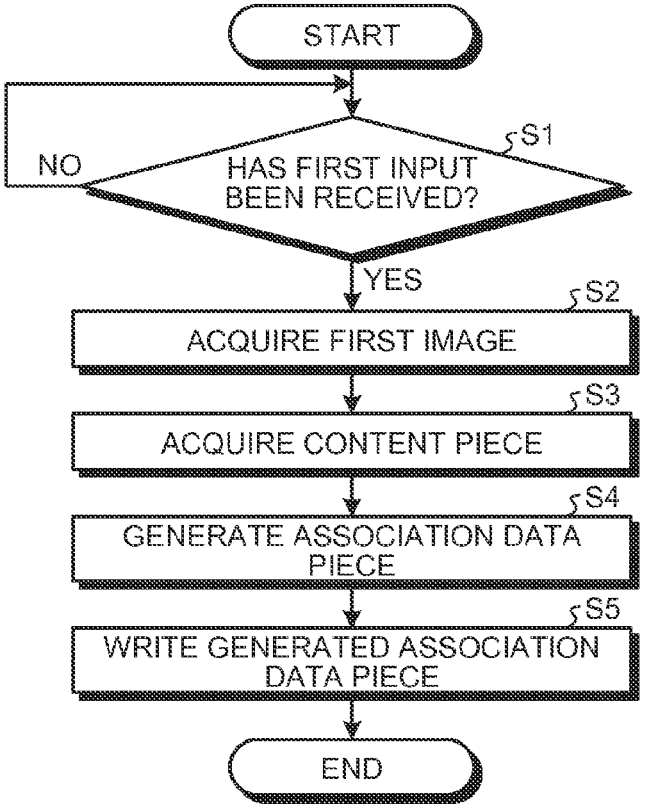

START
S1
HAS FIRST INPUT BEEN RECEIVED?
NO
YES
S2
ACQUIRE FIRST IMAGE
S3
ACQUIRE CONTENT PIECE
S4
GENERATE ASSOCIATION DATA PIECE
S5
WRITE GENERATED ASSOCIATION DATA PIECE
END

FIG.7

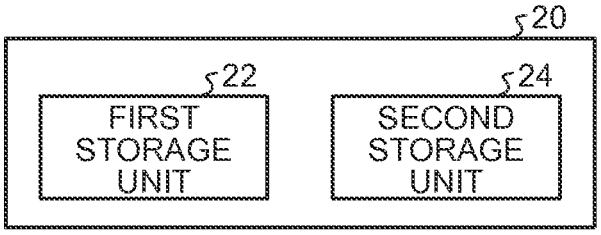


FIG.8

IMAGE INFORMATION	CONTENT ID
IMAGE A	CONTENT PIECE 1, CONTENT PIECE 2
IMAGE B	CONTENT PIECE 1
IMAGE C	CONTENT PIECE 3, CONTENT PIECE 4

ASSOCIATION DATA PIECE

FIG.9

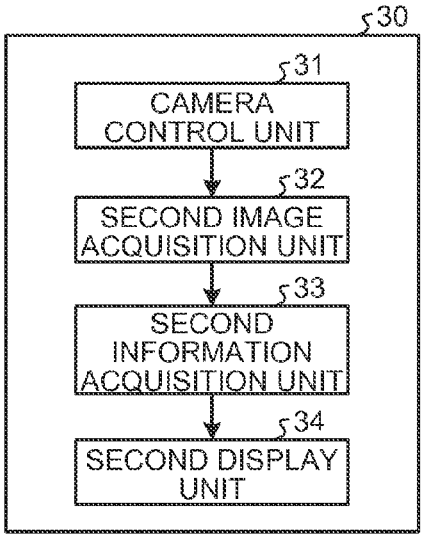

30
31
CAMERA CONTROL UNIT
32
SECOND IMAGE ACQUISITION UNIT
33
SECOND INFORMATION ACQUISITION UNIT
34
SECOND DISPLAY UNIT

FIG.10

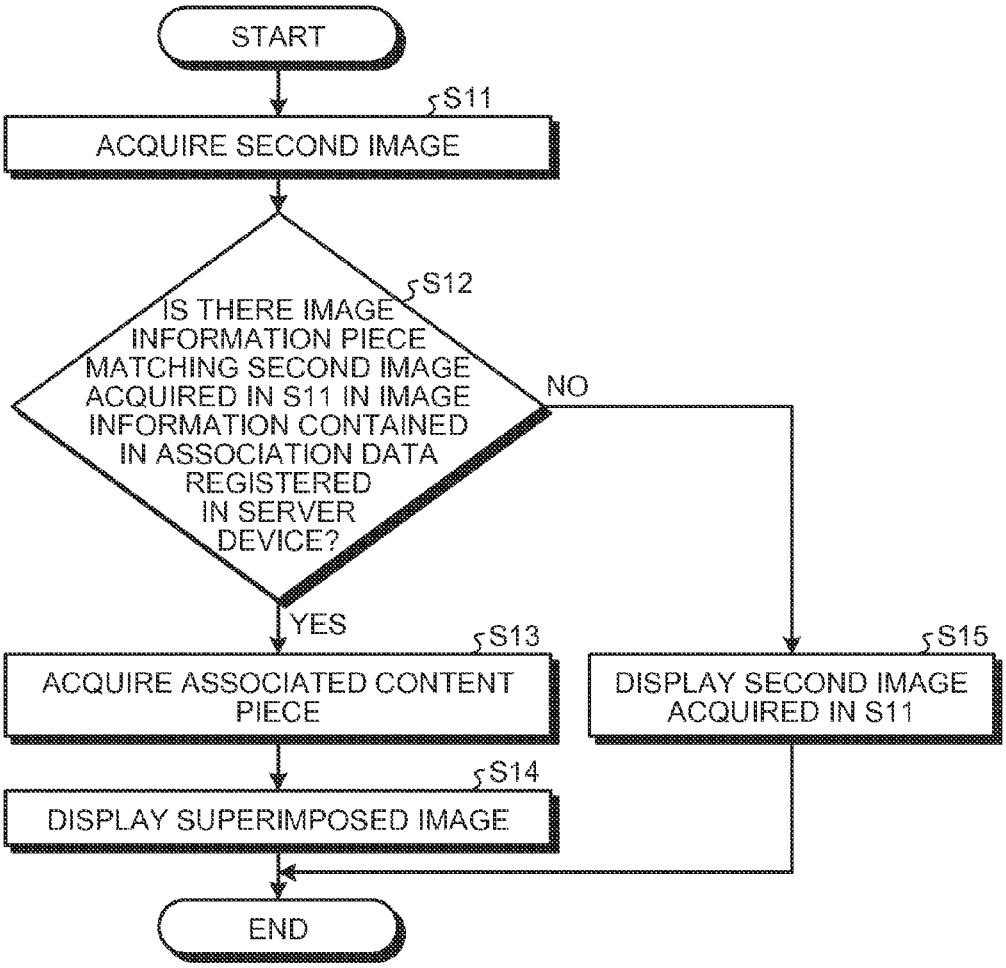

START
S11
ACQUIRE SECOND IMAGE
S12
IS THERE IMAGE INFORMATION PIECE MATCHING SECOND IMAGE ACQUIRED IN S11 IN IMAGE INFORMATION CONTAINED IN ASSOCIATION DATA REGISTERED IN SERVER DEVICE?
NO
YES
S13
ACQUIRE ASSOCIATED CONTENT PIECE
S14
DISPLAY SUPERIMPOSED IMAGE
S15
DISPLAY SECOND IMAGE ACQUIRED IN S11
END

FIG.11

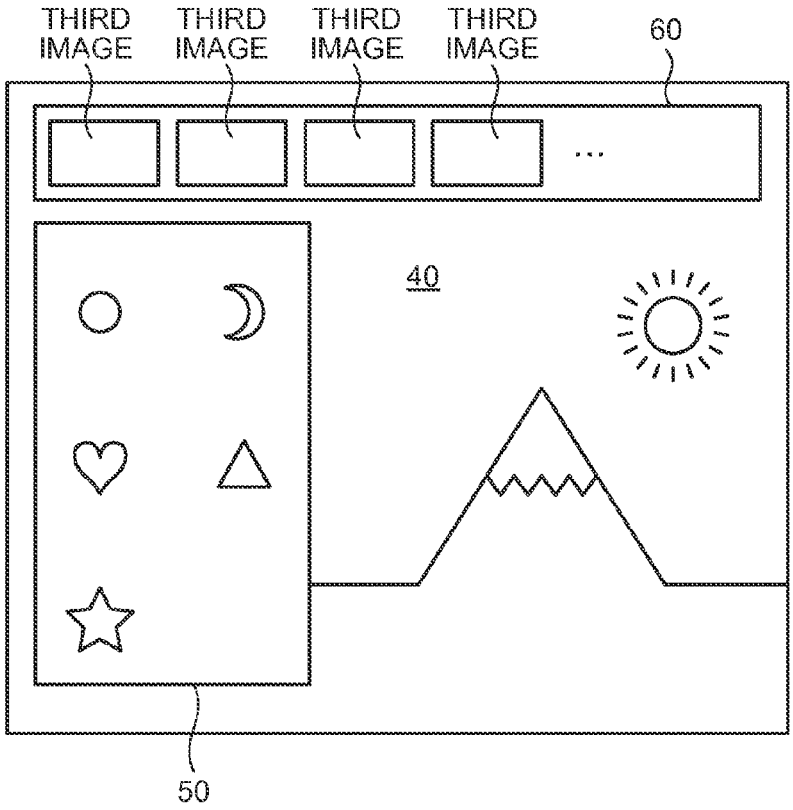

THIRD IMAGE
THIRD IMAGE
THIRD IMAGE
THIRD IMAGE
60
...
40
50

FIG.12

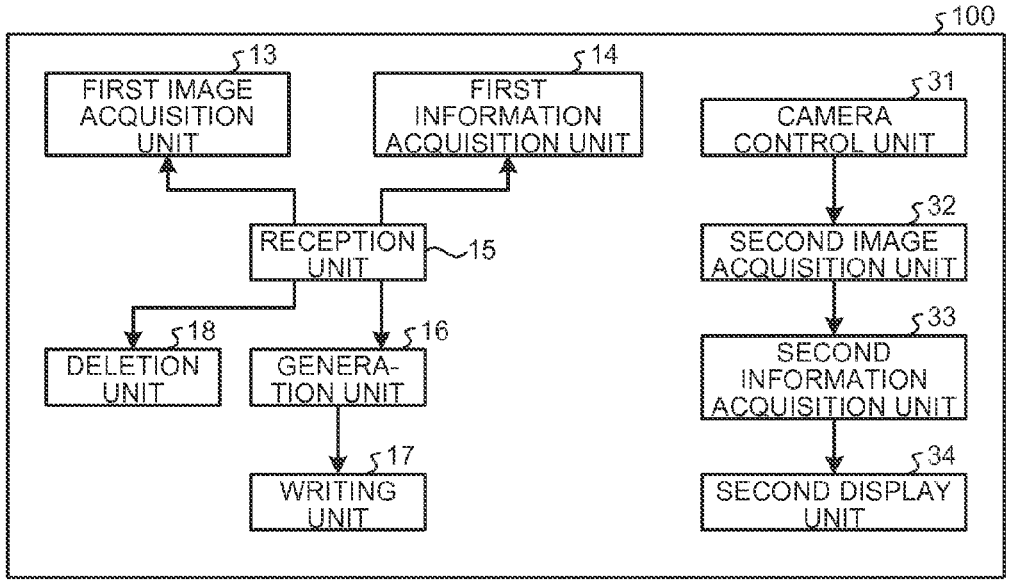

100
13
FIRST IMAGE ACQUISITION UNIT
14
FIRST INFORMATION ACQUISITION UNIT
31
CAMERA CONTROL UNIT
RECEPTION UNIT
15
32
SECOND IMAGE ACQUISITION UNIT
18
DELETION UNIT
16
GENERA-TION UNIT
33
SECOND INFORMATION ACQUISITION UNIT
17
WRITING UNIT
34
SECOND DISPLAY UNIT

FIG.13

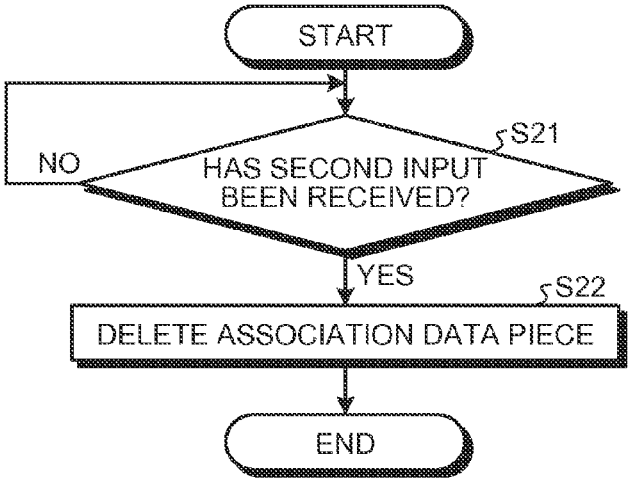

START
S21
NO
HAS SECOND INPUT BEEN RECEIVED?
YES
S22
DELETE ASSOCIATION DATA PIECE
END

FIG.14

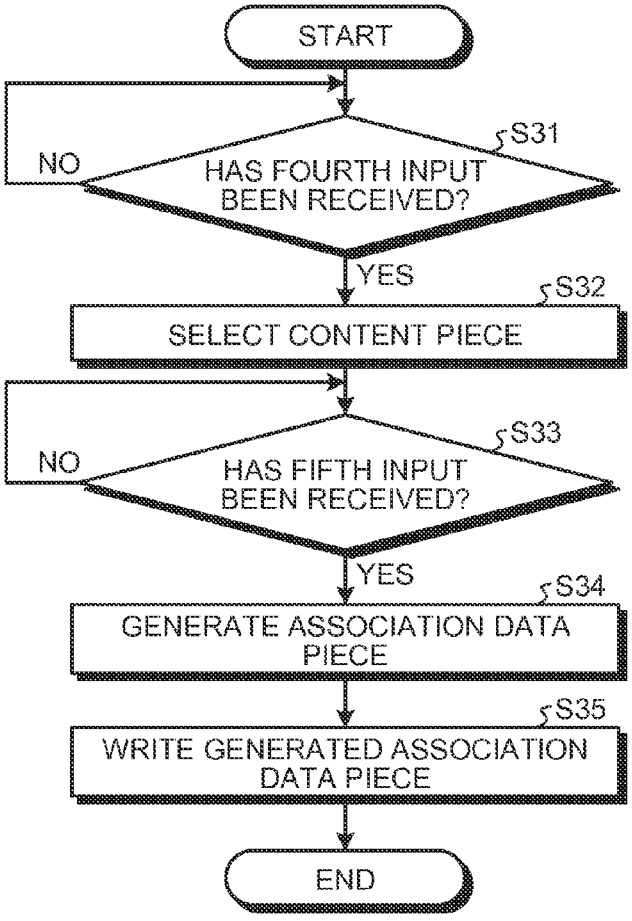
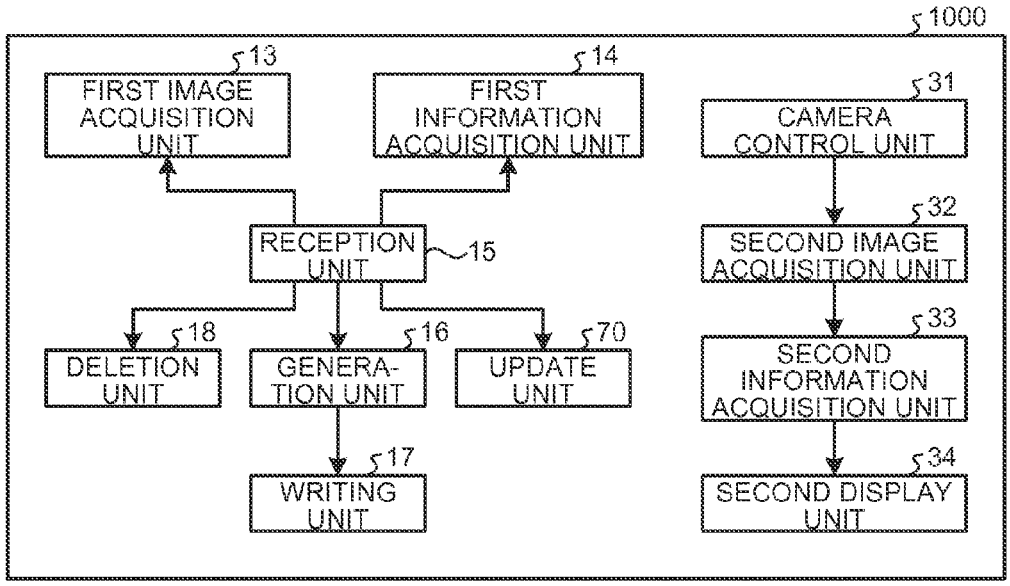

START
S31
NO
HAS FOURTH INPUT BEEN RECEIVED?
YES
S32
SELECT CONTENT PIECE
S33
NO
HAS FIFTH INPUT BEEN RECEIVED?
YES
S34
GENERATE ASSOCIATION DATA PIECE
S35
WRITE GENERATED ASSOCIATION DATA PIECE
END

FIG.15


1000
13
FIRST IMAGE ACQUISITION UNIT
14
FIRST INFORMATION ACQUISITION UNIT
31
CAMERA CONTROL UNIT
32
SECOND IMAGE ACQUISITION UNIT
33
SECOND INFORMATION ACQUISITION UNIT
34
SECOND DISPLAY UNIT
RECEPTION UNIT
15
18
DELETION UNIT
16
GENERA-TION UNIT
70
UPDATE UNIT
17
WRITING UNIT

INFORMATION PROCESSING APPARATUS, INFORMATION PROCESSING METHOD AND COMPUTER PROGRAM PRODUCT

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is based upon and claims the benefit of priority from Japanese Patent Application No. 2013-076979, filed on Apr. 2, 2013; the entire contents of which are incorporated herein by reference.

FIELD

Embodiments described herein relate generally to an information processing apparatus, an information processing method, and a computer program product.

BACKGROUND

Conventionally, there is known a technique of displaying virtual information so as to be superimposed over an image obtained by imaging a subject (imaging target) in the real world.

For example, there is known a technique of identifying an imaging target on the basis of the position and the angle of a terminal device, and displaying virtual information which has been previously associated with the imaging target so as to be superimposed over an image of the imaging target.

However, since the association relationship between an imaging target and virtual information is previously fixed in the conventional technique, there has been no system capable of, for example, freely registering association data obtained by associating an image of an imaging target with virtual information while imaging various imaging targets. Therefore, the convenience of a user is disadvantageously low.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a diagram illustrating an example of the configuration of an information processing system according to a first embodiment;

FIG. **2** is a diagram illustrating an example of the functional configuration of a registration device according to the first embodiment;

FIG. **3** is a diagram illustrating an example of the display on a screen according to the first embodiment;

FIG. **4** is a diagram illustrating an example of the display on the screen according to the first embodiment;

FIG. **5** is a diagram illustrating an example of the display on the screen according to the first embodiment;

FIG. **6** is a flowchart illustrating an example of the operation of the registration device according to the first embodiment;

FIG. **7** is a diagram illustrating an example of the configuration of a server device according to the first embodiment;

FIG. **8** is a diagram schematically illustrating data stored in a first storage unit according to the first embodiment;

FIG. **9** is a diagram illustrating an example of the functional configuration of a terminal device according to the first embodiment;

FIG. **10** is a flowchart illustrating an example of the operation of the terminal device according to the first embodiment;

FIG. **11** is a diagram illustrating an example of the display on a screen according to a modification;

FIG. **12** is a diagram illustrating an example of the functional configuration of an information processing apparatus according to a second embodiment;

FIG. **13** is a flowchart illustrating an example of the operation of the information processing apparatus according to the second embodiment;

FIG. **14** is a flowchart illustrating an example of the operation of the information processing apparatus according to the second embodiment; and

FIG. **15** is a diagram illustrating an example of the functional configuration of an information processing apparatus according to a modification.

DETAILED DESCRIPTION

According to an embodiment, an information processing apparatus includes a first image acquisition unit, a first information acquisition unit, a reception unit, a generation unit, and a writing unit. The first image acquisition unit is configured to acquire a first image obtained by imaging by an imaging unit. The first information acquisition unit is configured to acquire any of multiple pieces of information capable of being associated with the first image. The reception unit is configured to receive a first input. The generation unit is configured to associate the first image acquired in the first image acquisition unit with the information piece acquired in the first information acquisition unit to generate an association data piece when the reception unit receives the first input. The writing unit is configured to write the association data piece into a storage unit.

Various embodiments will be described in detail below with reference to the accompanying drawings.

First Embodiment

FIG. **1** is a diagram illustrating an example of the schematic configuration of an information processing system **1** according to the first embodiment. As illustrated in FIG. **1**, the information processing system **1** includes a registration device **10**, a server device **20**, and a terminal device **30**. In the example illustrated in FIG. **1**, the server device **20** is connected to each of the registration device **10** and the terminal device **30** via a network. In this specification, the information processing system **1** including a single terminal device **30** will be described as an example for convenience of explanation. However, the number of terminal devices **30** provided in the information processing system **1** is not limited to one, and may be any number.

First, the details of the registration device **10** will be described. FIG. **2** is a diagram illustrating an example of the functional configuration of the registration device **10**. The registration device **10** includes a portable information processing apparatus that has a function of imaging an imaging target (subject) and a touch panel function, and corresponds to "information processing apparatus" in the claims. In this example, the registration device **10** is equipped with a camera (not illustrated) which is an example of "imaging unit" in the claims and a touch panel display (not illustrated). In the present specification, "imaging" indicates converting an image of a subject (imaging target) formed by an optical system such as a lens into an electrical srgnal.

As illustrated in FIG. **2**, the registration device **10** includes a camera control unit **11**, a first display unit **12**, a first image acquisition unit **13**, a first information acquisition unit **14**, a reception unit **15**, a generation unit **16**, and a writing unit **17**.

When starting using the camera mounted on the registration device **10**, the camera control unit **11** continuously performs control for imaging an imaging target at which a lens of the camera is pointed at a predetermined cycle. Every time

when imaging is performed by the camera, the first display unit **12** performs control for displaying an image obtained by the imaging (in the following description, may also be referred to as "first image") on the touch panel display mounted on the registration device **10**. The touch panel display mounted on the registration device **10** has an area in which various pieces of information are displayed (in the following description, referred to as "screen"), and the first image obtained by imaging by the camera is displayed on the screen. In this example, when an imaging target at which the lens of the camera is pointed is switched to another imaging target, or when a target over which the registration device **10** equipped with the camera is held is switched to another target, a first image displayed on the screen is also switched to another first image in response thereto.

In the present embodiment, the first display unit **12** performs control for displaying multiple pieces of content capable of being associated with (linked to) a first image on the screen. In this specification, the content indicates information that includes at least one of an image (video), voice, text and URL indicating a link destination (address information), and corresponds to "information" in the claims. As will be described later, in the present embodiment, content is stored in the server device **20**. The first display unit **12** accesses the server device **20** to acquire multiple pieces of content capable of being associated with a first image. Then, the first display unit **12** performs control for displaying the acquired multiple pieces of content (or may also be icon images corresponding to the respective pieces of content) on the screen.

FIG. **3** is a diagram illustrating an example of the display on the screen according to the first embodiment. As illustrated in FIG. **3**, the screen includes an image area **40** in which the first image is displayed and a content area **50** in which multiple pieces of content are displayed. In this example, the image area **40** corresponds to "image area" in the claims, and the content area **50** corresponds to "information area" in the claims.

The description will be continued with reference to FIG. **2**. The first image acquisition unit **13** has a function of acquiring the first image. In the present embodiment, the first image acquisition unit **13** has a function of acquiring the first image displayed on the screen according to an instruction from the reception unit **15**.

The first information acquisition unit **14** has a function of acquiring any of multiple pieces of content. In the present embodiment, the first information acquisition unit **14** has a function of acquiring any of multiple pieces of content that are displayed on the content area **50** according to an instruction from the reception unit **15**.

The reception unit **15** has a function of receiving a first input from a user. In the present embodiment, the first input indicates an input for instructing selection of any piece of the content. When receiving the first input, the reception unit **15** instructs the first image acquisition unit **13** to acquire a first image, and instructs the first information acquisition unit **14** to acquire a content piece that has been instructed to be selected.

More specifically, the first input in the present embodiment is an input according to an operation of: bringing a pointing object such as a finger and a touch pen into contact with a first area on the screen in which any piece of the content is displayed; then moving the pointing object to the image area **40** with being in contact with the screen; and then releasing the pointing object from the screen. In this example, the reception unit **15** has a function of detecting the contact position (touch position) of the pointing object with the screen and the trajectory of the contact position. The reception unit **15** instructs the first display unit **12** to display the content piece so as to follow the detected contact position and trajectory. Upon receiving the instruction, the first display unit **12** performs control for displaying the content piece displayed in the first area so as to follow the trajectory of the pointing object which moves while making contact with the screen.

When receiving the first input, the reception unit **15** instructs the first image acquisition unit **13** to acquire a first image that is being displayed on the screen when the pointing object is released from the screen, and instructs the first information acquisition unit **14** to acquire a content piece corresponding to the first area (a content piece that has been instructed to be selected).

When the reception unit **15** receives the first input, the generation unit **16** associates the first image acquired in the first image acquisition unit **13** with the content piece acquired in the first information acquisition unit **14** to thereby generate an association data piece. In the present embodiment, when receiving the first input, the reception unit **15** instructs the generation unit **16** to generate an association data piece. Then, upon receiving the instruction, the generation unit **16** associates the first image acquired in the first image acquisition unit **13** (in this example, the first image that is being displayed when the pointing object is released from the screen) with the content piece acquired in the first information acquisition unit **14** (the content piece corresponding to the first area) to thereby generate an association data piece. In this example, the generation unit **16** associates image that indicates the first image acquired in the first image acquisition unit **13** with a content ID that identifies the content piece acquired in the first information acquisition unit **14** to thereby generate the association data piece. However, the generation unit **16** is not limited thereto.

For example, a case where a user performs an operation in which a finger of the user is brought into contact with the first area in which a content piece X is displayed in the content area **50** as illustrated in FIG. **4**, then moved to the image area **40** with being in contact with the screen as illustrated in FIG. **5**, and then released from the screen is assumed. In this case, as illustrated in FIGS. **4** and **5**, the first display unit **12** performs control for displaying the content piece X so as to follow the trajectory of the finger. When a user releases his/her finger from the screen as illustrated in FIG. **5**, the first image that is being displayed in the image area **40** at this moment is associated with the content piece X so that an association data piece is generated.

The description will be continued with reference to FIG. **2**. The writing unit **17** performs control for writing the association data piece generated in the generation unit **16** into the server device **20**. Although, in this example, the server device **20** corresponds to "storage unit" in the claims, the server device **20** is not limited thereto.

The registration device **10** according to the present embodiment has a hardware configuration that uses a computer provided with a CPU, a storage unit such as read only memory (ROM) and RAM, and a touch panel display. The functions of the respective units (the camera control unit **11**, the first display unit **12**, the first image acquisition unit **13**, the first information acquisition unit **14**, the reception unit **15**, the generation unit **16**, and the writing unit **17**) of the registration device **10** are implemented by executing programs stored in the storage unit by the CPU, but not limited thereto. For example, at least some of the functions of the respective units of the registration device **10** may also be implemented by a hardware circuit (a semiconductor integrated circuit, for example).

Next, an example of the operation of the registration device **10** will be described. FIG. **6** is a flowchart illustrating an example of the operation of the registration device **10**. As illustrated in FIG. **6**, the reception unit **15** first determines whether or not the first input has been received (step S**1**). When the first input is determined to have been received (YES at step S**1**), the reception unit **15** instructs the first image acquisition unit **13** to acquire a first image, and instructs the first information acquisition unit **14** to acquire a content piece that has been instructed to be selected. Further, the reception unit **15** instructs the generation unit **16** to generate an association data piece.

Upon receiving the instruction from the reception unit **15**, the first image acquisition unit **13** acquires the first image (step S**2**). Upon receiving the instruction from the reception unit **15**, the first information acquisition unit **14** acquires the content piece that has been instructed to be selected (step S**3**). Step S**2** and step S**3** can be performed in any order, and may also be performed at the same time.

Then, upon receiving the instruction from the reception unit **15**, the generation unit **16** associates the first image acquired in step S**2** with the content piece acquired in step S**3** to thereby generate an association data piece (step S**4**). Then, the writing unit **17** performs control for writing the association data piece generated in step S**4** into the server device **20** (step S**5**).

Next, the details of the server device **20** will be described. As illustrated in FIG. **7**, the server device **20** includes a first storage unit **22** and a second storage unit **24**. The first storage unit **22** stores therein association data generated in the registration device **10**. FIG. **8** is a diagram schematically illustrating multiple pieces of association data stored in the first storage unit **22**. As illustrated in FIG. **8**, the first storage unit **22** stores therein multiple pieces of association data each piece of which is generated by associating image indicating a first image with one or more content IDs. For example, an association data piece in the first line indicates that a content ID representing "CONTENT **1**" and a content ID representing "CONTENT **2**" are associated with image representing "IMAGE A".

The second storage unit **24** associates respective multiple content IDs with content information indicating respective content pieces (information including the contents and the displayed position), and stores therein the associated content IDs and content information. In this example, the associated content piece (content information) can be identified by using the content ID contained in the association data piece as a key. Therefore, the association data piece can be regarded as associating image (first image) with a content piece. The configuration of each association data piece is not limited to the above configuration. For example, the association data piece may be configured by associating image with content information.

Although not described in detail here, the server device **20** has a function of communicating with each of the registration device **10** and the terminal device **30**. In response to a request from the registration device **10** or the terminal device **30**, the server device **20** can write association date into the first storage unit **22**, and read out (also transmit) and delete information stored in the first storage unit **22** and the second storage unit **24**.

Next, the details of the terminal device **30** will be described. FIG. **9** is a block diagram illustrating an example of the functional configuration of the terminal device **30**. In the present embodiment, the terminal device **30** includes a portable information processing apparatus that has a function of imaging an imaging target. In this example, the terminal device **30** is equipped with a camera (not illustrated). As illustrated in FIG. **9**, the terminal device **30** includes a camera control unit **31**, a second image acquisition unit **32**, a second information acquisition unit **33**, and a second display unit **34**.

When starting using the camera mounted on the terminal device **30**, the camera control unit **31** continuously performs control for imaging an imaging target at which a lens of the camera is pointed at a predetermined cycle. Every time when imaging is performed by the camera, the second image acquisition unit **32** acquires an image obtained by the imaging (in the following description, may also be referred to as "second image"), and outputs the acquired second image to the second information acquisition unit **33**.

The second information acquisition unit **33** determines whether or not the second image acquired by the second image acquisition unit **32** matches any image (first image) contained in the association data registered in the server device **20**. When there is no image that matches the second image acquired by the second image acquisition unit **32** in the image contained in the association data registered in the server device **20**, the second information acquisition unit **33** directly outputs the second image to the second display unit **34**. On the other hand, when there is an image that matches the second image acquired by the second image acquisition unit **32** in the image contained in the association data registered in the server device **20**, the second information acquisition unit **33** acquires a content piece that is associated with the image that matches the second image. In the present embodiment, the second information acquisition unit **33** acquires content information corresponding to a content ID that is associated with the image that matches the second image in the image contained in the registered association data from the server device **20**. Then, the second information acquisition unit **33** outputs the content piece (content information) acquired from the server device **20** to the second display unit **34** together with the second image acquired by the second image acquisition unit **32**.

The second display unit **34** performs control for displaying the information output from the second information acquisition unit **33** on a display device (not illustrated) which is mounted on the terminal device **30**. The display device mounted on the terminal device **30** has an area (screen) on which various pieces of information are displayed, and information output from the second information acquisition unit **33** is displayed on the screen. As described above, for example, when there is no image that matches the second image acquired by the second image acquisition unit **32** in the image contained in the registered association data, the second information acquisition unit **33** directly outputs the second image to the second display unit **34**. Therefore, the second display unit **34** performs control for directly displaying the second image output from the second information acquisition unit **33** on the screen.

On the other hand, when there is an image that matches the second image acquired by the second image acquisition unit **32** in the image contained in the registered association data, the second information acquisition unit **33** outputs a content piece that is associated with the image that matches the second image and the second image acquired by the second image acquisition unit **32**. Therefore, the second display unit **34** performs control for displaying a superimposed image of the second image output from the second information acquisition unit **33** and the content piece on the screen.

The terminal device **30** according to the present embodiment has a hardware configuration that uses a computer provided with a CPU, a storage unit such as read only memory (ROM) and RAM, and a display device. The functions of the respective units (the camera control unit **31**, the second image

acquisition unit **32**, the second information acquisition unit **33**, and the second display unit **34**) of the terminal device **30** are implemented by executing programs stored in the storage unit by the CPU, but not limited thereto. For example, at least some of the functions of the respective units of the terminal device **30** may also be implemented by a hardware circuit (a semiconductor integrated circuit, for example).

Next, an example of the operation of the terminal device **30** will be described. FIG. **10** is a flowchart illustrating an example of the operation of the terminal device **30**. As illustrated in FIG. **10**, every time when imaging is performed by the camera, the second image acquisition unit **32** acquires an image (second image) obtained by the imaging (step S**11**). Then, the second information acquisition unit **33** determines whether or not there is any image that matches the second image acquired in step S**11** in the image contained in the association data registered in the server device **20** (step S**12**).

In step S**12** described above, when an image that matches the second image acquired in step S**11** is determined to exist in the image contained in the registered association data (YES at step S**12**), the second information acquisition unit **33** acquires a content piece that is associated with the image that matches the second image acquired in step S**11** from the server device **20** (step S**13**). Then, the second information acquisition unit **33** outputs the acquired content piece and the second image acquired in step S**11** to the second display unit **34**. Then, the second display unit **34** performs control for displaying a superimposed image of the second image output from the second information acquisition unit **33** and the content piece on the screen (step S**14**).

On the other hand, when an image that matches the second image acquired in step S**11** is determined not to exist in the image contained in the registered association data (NO at step S**12**), the second information acquisition unit **33** directly outputs the second image acquired in step S**11** to the second display unit **34**. Then, the second display unit **34** performs control for directly displaying the second image output from the second information acquisition unit **33** on the screen (step S**15**).

As described above, in the present embodiment, when receiving the first input, a first image obtained by imaging by the camera is associated with any piece of the content to generate (and register) an association data piece. Therefore, a user can freely register an association data piece in which the first image is associated with any piece of the content by pointing the lens of the camera mounted on the registration device **10** at a desired imaging target, or holding the registration device **10** equipped with the camera over a desired imaging target to perform the operation for the first input.

More specifically, the first input is made for instructing selection of any piece of the content. When receiving the first input, the reception unit **15** instructs the first image acquisition unit **13** to acquire a first image, and instructs the first information acquisition unit **14** to acquire a content piece that has been instructed to be selected. In the above embodiment, only by pointing the lens of the camera mounted on the registration device **10** at a desired imaging target and performing an operation for instructing selection of a desired content piece while confirming a first image displayed on the screen, a user can generate an association data piece in which the first image that is being displayed on the screen at this moment is associated with the content piece that has been instructed to be selected, and register the generated association data piece. As described above, according to the present embodiment, an advantageous effect such as further improved convenience of a user who registers association data can be achieved.

Modification **1** of First Embodiment

For example, the first input may be an input according to an operation of bringing a pointing object (a finger or a touch pen, for example) into contact with a first area on the screen in which any piece of content is displayed. When receiving such a first input, the reception unit **15** instructs the first image acquisition unit **13** to acquire a first image that is being displayed on the screen when the pointing object makes contact with the screen, and instructs the first information acquisition unit **14** to acquire a content piece that corresponds to the first area (a content piece corresponding to an area on the screen with which the pointing object makes contact). In this case, only by bringing the pointing object such as a finger into contact with the area (the first area) in which a desired content piece is displayed in the content area **50**, a user can generate an association data piece by associating the first image that is being displayed on the screen at this moment with the desired content piece and register the generated association data piece. As a result, the convenience of a user is further improved.

Modification **2** of First Embodiment

The first input is only required to be an initiator for generating an association data piece, and the mode thereof can therefore be voluntarily changed. For example, the first input may include an input for instructing display of a still image of an imaging target at which the lens of the camera mounted on the registration device **10** is pointed and an input for instructing selection of any piece of content. In such a first input, for example, when a user performs an operation for instructing display of a still image of a first image that is being currently displayed on the screen while confirming first images which are sequentially displayed on the screen such as an operation of touching an icon of a photographing button, the reception unit **15** receives an input according to the operation. Then, the reception unit **15** instructs the first display unit **12** to display the still image of the first image that is currently being displayed on the screen, and instructs the first image acquisition unit **13** to acquire the first image displayed as the still image. Thereafter, when the user performs an operation for instructing selection of a desired content piece, the reception unit **15** receives an input according to the operation. Then, the reception unit **15** can instruct the first information acquisition unit **14** to acquire the content piece that has been instructed to be selected, and instruct the generation unit **16** to generate an association data piece.

In this example, a user points the lens of the camera mounted on the registration device **10** at a desired imaging target, or holds the registration device **10** equipped with the camera over a desired imaging target, then performs an operation for instructing display of a still image of a first image that is being currently displayed on the screen while confirming first images which are sequentially displayed on the screen such as an operation of touching an icon of a photographing button, and then performs an operation for instructing selection of a desired content piece. As a result, the user can generate an association data piece in which the still image of the first image is associated with the content piece that has been instructed to be selected, and register the generated association data piece.

Modification **3** of First Embodiment

For example, when a first image acquired in the first image acquisition unit **13** matches or is similar to an image contained in association data registered in the server device **20**, and a content piece that is associated with the image that matches or is similar to the first image acquired in the first image acquisition unit **13** in content contained in the association data registered in the server device **20** matches a content

piece acquired in the first information acquisition unit **14**, the generation unit **16** may not generate an association data piece. That is, when attempting to associate the same content piece with similar images, overlapping registration may not be performed.

In such a configuration, a function of determining whether or not a first image acquired in the first image acquisition unit **13** matches or is similar to an image contained in association data registered in the server device **20** and a function of determining whether or not a content piece that is associated with the image that matches or is similar to the first image acquired in the first image acquisition unit **13** in content contained in the association data registered in the server device **20** matches a content piece acquired in the first information acquisition unit **14** may be provided in the generation unit **16**, or may also be separately (independently) provided from the generation unit **16**.

Modification **4** of First Embodiment

For example, as illustrated in FIG. **11**, the first display unit **12** can also display third images capable of identifying first images with which respective content pieces have already been associated. In the example illustrated in FIG. **11**, the third images are thumbnail images (reduced images for listing multiple images) of first images with which respective content pieces have already been associated. However, the third images are not limited thereto. In the example illustrated in FIG. **11**, the screen further includes a candidate area **60** in which the multiple third images are displayed in addition to the image area **40** and the content area **50**.

In the example illustrated in FIG. **11**, when receiving a sixth input for instructing selection of any of the third images, the reception unit **15** instructs the first image acquisition unit **13** to acquire a first image, and instructs the generation unit **16** to generate an association data piece in which a content piece that corresponds to the third image that has been instructed to be selected (the same content piece as a content piece that has already been associated with the first image identified by the selected third image) is associated with the first image acquired in the first image acquisition unit **13**. In this example, the sixth input indicates an input according to an operation of bringing a pointing object such as a finger and a touch pen into contact with an area in which any of the third images is displayed in the candidate area **60**. However, the sixth input is not limited thereto.

For example, when attempting to associate multiple content pieces that are the same as multiple content pieces associated with an image contained in the registered association data with an imaging target at which the lens of the camera mounted on the registration device **10** is pointed, it is only required for a user to perform an operation for instructing selection of a thumbnail image (third image) that corresponds to the image (the first image with which the content pieces are already associated) in the candidate area **60**. Therefore, the convenience of a user is further improved.

Second Embodiment

Next, the second embodiment will be described. The second embodiment is different from the first embodiment in that the registration device **10** and the terminal device **30** are configured as a single device. Hereinbelow, the details of the second embodiment will be described. A description of overlapping points with the first embodiment will appropriately be omitted.

FIG. **12** is a diagram illustrating an example of the functional configuration of an information processing apparatus **100** according to the second embodiment. The information processing apparatus **100** includes a portable information processing apparatus that has a function of imaging an imaging target and a touch panel function, and corresponds to "information processing apparatus" in the claims. In this example, the information processing apparatus **100** is equipped with a camera (not illustrated) and a touch panel display (not illustrated). Further, the information processing apparatus **100** is equipped with the functions of the registration device **10** and the functions of the terminal device **30**. The information processing apparatus **100** is connected to the server device **20** via a network.

As illustrated in FIG. **12**, the information processing apparatus **100** includes a first image acquisition unit **13**, a first information acquisition unit **14**, a reception unit **15**, a generation unit **16**, a writing unit **17**, a deletion unit **18**, a camera control unit **31**, a second image acquisition unit **32**, a second information acquisition unit **33**, and a second display unit **34**.

In this example, the camera control unit **31** also serves as the camera control unit **11** described above. The second display unit **34** also serves as the first display unit **12** described above. Therefore, the second display unit **34** also performs control for displaying multiple pieces of content that can be associated with an image obtained by imaging by the camera on the screen (here, the screen indicates an area in which various pieces of information are displayed on the touch panel display mounted on the information processing apparatus **100**). In the following description, an area on the screen in which an image (including a superimposed image) is displayed is referred to as an image area, and an area on the screen in which multiple pieces of content (may be icon images corresponding to the respective pieces of content) are displayed is referred to as a content area. In this example, an image obtained by imaging by the camera mounted on the information processing apparatus **100** can be regarded as the above-described second image, and can also be regarded as the above-described first image. In the following description, in images obtained by imaging by the camera, an image acquired in the second image acquisition unit **32** is referred to as "second image", and an image acquired in the first image acquisition unit **13** is referred to as "first image", thereby distinguishing the images.

In the present embodiment, when a user starts using the camera mounted on the information processing apparatus **100**, the camera control unit **31** continuously performs control for imaging an imaging target (subject) at which a lens of the camera is pointed at a predetermined cycle. Every time when imaging is performed by the camera, the second image acquisition unit **32** acquires an image obtained by the imaging, and outputs the acquired image (second image) to the second information acquisition unit **33**. Then, in the same manner as in the first embodiment, when there is no image that matches the second image acquired by the second image acquisition unit **32** in image contained in association data registered in the server device **20**, the second image is directly displayed on the screen. On the other hand, when there is an image that matches the second image in the image contained in the association data registered in the server device **20**, a superimposed image of a content piece that is associated with the image that matches the second image and the second image is displayed on the screen.

Next, the function of the deletion unit **18** will be described. Under the state that the superimposed image is displayed on the screen, when the reception unit **15** receives a second input for instructing deletion of an association data piece in which a content piece included in a superimposed image is associated with an image, the deletion unit **18** performs control for deleting the association data piece from the server device **20**. The second input in the present embodiment indicates an input according to an operation of: bringing a pointing object

into contact with a second area in which the content piece included in the superimposed image is displayed in the image area; moving the pointing object to the outside of the image area (to the content area, for example) with being in contact with the screen; and then releasing the pointing object from the screen. However, the second input is not limited thereto. For example, the second input may be an input according to an operation of bringing a pointing object such as a finger and a touch pen into contact with an icon (UI image) which is used for instructing deletion of the association data piece that corresponds to the content piece included in the superimposed image and displayed on the screen. Further, the second input may be an input according to an operation of shaking the information processing apparatus **100**.

When the reception unit **15** receives the second input, the reception unit **15** instructs the deletion unit **18** to delete the association data piece in which the content piece included in the superimposed image is associated with the image. Upon receiving the instruction, the deletion unit **18** performs control for deleting the association data piece in which the content piece included in the superimposed image is associated with the image from the server device **20**. More specifically, the deletion unit **18** performs control for deleting the association data piece in which a content ID that identifies the content piece included in the superimposed image is associated with the image among the association data pieces registered in the server device **20** from the first storage unit **22**.

FIG. **13** is a flowchart illustrating an example of the operation of the information processing apparatus **100** when deleting an association data piece that corresponds to a content piece included in a superimposed image. As illustrated in FIG. **13**, the reception unit **15** first determines whether or not the second input has been received (step S**21**). When the second input is determined to have been received (YES at step S**21**), the reception unit **15** instructs the deletion unit **18** to delete an association data piece that corresponds to a content piece included in a superimposed image. Upon receiving the instruction, the deletion unit **18** performs control for deleting the association data piece that corresponds to the content piece included in the superimposed image from the server device **20** (step S**22**).

Next, an example of a method for generating an association data piece in which a content piece included in a superimposed image is associated with a new first image and registering the generated association data piece. In the present embodiment, when the reception unit **15** receives a third input for instructing registration of an association data piece in which a content piece included in a superimposed image is associated with a first image newly acquired in the first image acquisition unit **13**, the generation unit **16** generates the association data piece in which the content piece included in the superimposed image is associated with the first image newly acquired in the first image acquisition unit **13**. Then, the writing unit **17** performs control for writing the association data piece newly generated by the generation unit **16** into the server device **20**.

The third input in the present embodiment includes a fourth input for instructing selection of a content piece that is included in a superimposed image and a fifth input for instructing acquisition of a first image. When receiving the fourth input, the reception unit **15** selects the content piece included in the superimposed image. In the present embodiment, the fourth input indicates an input according to an operation of bringing a pointing object into contact with the second area on the screen in which the content piece included in the superimposed image is displayed. However, the fourth input is not limited thereto. For example, the fourth input may be an input according to an operation of shaking the information processing apparatus **100**, and may also be an input according to an operation of lifting up and scooping the information processing apparatus **100**. When receiving the fourth input, the reception unit **15** selects the content piece that is included in the superimposed image.

A method for selecting a content piece included in a superimposed image may be any method. For example, the reception unit **15** can select a content piece included in a superimposed image by instructing deletion unit **18** to delete an association data piece that corresponds to the content piece included in the superimposed image and also cutting off a content ID from the association data piece that corresponds to the content piece included in the superimposed image. Alternatively, for example, the reception unit **15** can select a content piece included in a superimposed image by generating a copy of a content ID from an association data piece that corresponds to the content piece included in the superimposed image.

Further, when receiving the fourth input, the reception unit **15** instructs the second display unit **34** to perform control for displaying the content piece included in the superimposed image so as to stick to a pointing object. Upon receiving the instruction, the second display unit **34** performs control for displaying the content piece included in the superimposed image so as to stick to the pointing object. As a result, a user can intuitively understand that the content piece included in the superimposed image has been selected.

When receiving a fifth input after the fourth input, the reception unit **15** instructs the first image acquisition unit **13** to acquire a first image, and instructs the generation unit **16** to generate an association data piece in which the first image acquired in the first image acquisition unit **13** is associated with the content piece that has been selected in response to the fourth input. Although the fifth input indicates an input according to an operation of releasing a pointing object from the screen in the present embodiment, the fifth input is not limited thereto. Upon receiving the instruction from the reception unit **15**, the first image acquisition unit **13** acquires an image that has been obtained by imaging and is being displayed on the screen when the pointing object is released from the screen. Upon receiving the instruction from the reception unit **15**, the generation unit **16** associates the image (first image) acquired by the first image acquisition unit **13** with the content piece (the content ID in this example) selected by the reception unit **15** to thereby generate an association data piece.

For example, a user performs an operation of bringing a pointing object into contact with the second area on the screen in which a content piece is displayed (an operation for instructing selection of the content piece), and then performs and operation of switching an imaging target (a target over which the information processing apparatus **100** equipped with the camera is held) to another imaging target with the pointing object being in contact with the screen to thereby switch an image displayed on the screen to another image and then releasing the pointing object from the screen. In this manner, a user can generate an association data piece in which the content piece that has been instructed to be selected is associated with the image that is being displayed when the pointing object is released from the screen, and register the generated association data piece.

FIG. **14** is a flowchart illustrating an example of the operation of the information processing apparatus **100** when generating an association data piece in which a content piece included in a superimposed image is associated with a newly acquired first image, and registering the generated association

data piece. As illustrated in FIG. **14**, the reception unit first determines whether or not the fourth input has been received (step S**31**). When the fourth input is determined to have been received (YES at step S**31**), the reception unit **15** selects a content piece included in a superimposed image (step S**32**). Then, the reception unit **15** determines whether or not the fifth input has been received (step S**33**). When the fifth input is determined to have been received (YES at step S**33**), the reception unit **15** instructs the first image acquisition unit **13** to acquire a first image, and instructs the generation unit **16** to generate an association data piece in which the first image acquired in the first image acquisition unit **13** is associated with the content piece selected in step S**32**. Upon receiving the instruction from the reception unit **15**, the first image acquisition unit **13** acquires an image that has been obtained by imaging and is being displayed on the screen when a pointing object is released from the screen. Upon receiving the instruction from the reception unit **15**, the generation unit **16** associates the image (first image) acquired by the first image acquisition unit **13** with the content piece selected in step S**32** to thereby generate an association data piece (step S**34**). Then, the writing unit **17** performs control for writing the association data piece generated in step S**34** into the server device **20** (step S**35**).

Also in the second embodiment, the same effect as in the first embodiment can be obtained.

Modification **1** of Second Embodiment

For example, under the state that a superimposed image is displayed on the screen, when a new content piece is selected, the new content piece may be added to the registered association data. FIG. **15** is a block diagram illustrating an example of the functional configuration of an information processing apparatus **1000** according to Modification **1**. As illustrated in FIG. **15**, the image processor **1000** is different from the second embodiment in that the image processor **1000** further includes an update unit **70**.

In the example illustrated in FIG. **15**, when the reception unit **15** receives an input for instructing selection of any of multiple pieces of content that are displayed on the content area (corresponding to the first input described above), with a superimposed image displayed on the screen, the reception unit **15** instructs the first information acquisition unit **14** to acquire the content piece that has been instructed to be selected. Further, the reception unit **15** instructs the update unit **70** to update an association data piece (an association data piece registered in the server device **20**) that corresponds to a content piece included in the superimposed image.

Upon receiving the instruction from the reception unit **15**, the update unit **70** performs control for adding the content piece acquired in the first information acquisition unit **14** to the registered association data piece that corresponds to the content piece included in the superimposed image. As a result, the registered association data piece that corresponds to the content piece included in the superimposed image is updated into an association data piece in which the content piece included in the superimposed image, the newly selected content piece (the content piece acquired in the first information acquisition unit **14**) and an image are associated with each other.

Modification **2** of Second Embodiment

For example, the first storage unit **22** and the second storage unit **24** may be provided within the information processing apparatus **100** without providing the server device **20**.

Further, programs executed in the registration device **10**, the terminal device **30** and the information processing apparatus **100** may be provided by being stored in a computer that is connected to a network such as the Internet, and causing the stored programs to be downloaded via the network. Furthermore, the programs executed in the registration device **10**, the terminal device **30** and the information processing apparatus **100** may also be provided or distributed via a network such as the Internet. Moreover, the programs executed in the registration device **10**, the terminal device **30** and the information processing apparatus **100** may also be provided by being previously embedded in a nonvolatile recording medium such as ROM.

While certain embodiments have been described, these embodiments have been presented by way of example only, and are not intended to limit the scope of the inventions. Indeed, the novel embodiments described herein may be embodied in a variety of other forms; furthermore, various omissions, substitutions and changes in the form of the embodiments described herein may be made without departing from the spirit of the inventions. The accompanying claims and their equivalents are intended to cover such forms or modifications as would fall within the scope and spirit of the inventions.

What is claimed is:

1. An information processing apparatus comprising:

a hardware processor configured to control the apparatus to at least:

acquire a first image obtained by imaging;

acquire any of multiple pieces of information capable of being associated with the first image;

receive a first input;

associate the acquired first image with the acquired information piece to generate an association data piece when the first input is received;

write the association data piece into storage; and

control displaying of the first image and one or more pieces of the information, wherein

the first input is an input based on: receiving selection by a pointing object with respect to a first area of a screen that includes an image area in which the first image is displayed and an information area in which one or more pieces of the information are displayed; detecting moving of the pointing object to the image area and then detecting releasing of the pointing object, and

when the first input is received

the first image displayed on the screen when the pointing object is released is acquired, and

the information piece corresponding to the first area is acquired.

2. The apparatus according to claim **1**, wherein

the first input is an input based on: detecting the pointing object in contact with the first area of the screen; detecting moving of the pointing object to the image area while contact with the screen is maintained; and then detecting releasing of the pointing object from the screen.

3. The apparatus according to claim **2**, wherein the hardware processor is further configured to control the apparatus to display the information piece displayed in the first area so as to follow a trajectory of the moving pointing object.

4. The apparatus according to claim **2**, wherein

the hardware processor is configured to control display of second images capable of identifying first images with which information pieces have already been associated, and

when receiving a second input for selecting any of the second images, the hardware processor is configured to control the apparatus to acquire the first image, and generate an association data piece in which an informa-

tion piece that corresponds to the second image that has been instructed to be selected is associated with the acquire first image.

5. The apparatus according to claim **1**, wherein the hardware processor is further configured to control the apparatus to:

acquire a second image obtained by imaging;

acquire an information piece associated with a first image that matches the second image among first images contained in association data written into the storage; and

display a superimposed image of the second image and the acquired information piece associated with the matched first image.

6. The apparatus according to claim **5**, wherein the hardware processor is further configured to control the apparatus to delete from the storage the association data piece in which the information piece included in the superimposed image is associated with the matched first image, in response to receiving a second input.

7. The apparatus according to claim **6**, wherein

the second input is an input based on: detecting the pointing object in contact with a second area in which the information piece included in the superimposed image is displayed on a screen that includes an image area in which the superimposed image is displayed; detecting moving of the pointing object to outside the image area while contact with the screen is maintained; and then detecting releasing the pointing object from the screen, and

when receiving the second input, the hardware processor is further configured to control the apparatus to delete, from the storage, the association data piece in which the information piece included in the superimposed image is associated with the matched first image.

8. The apparatus according to claim **5**, wherein, when a second input is received for instructing registration of an association data piece in which the information piece included in the superimposed image is associated with a newly acquired first image, the hardware processor is further configured to control the apparatus to generate an association data piece in which the information piece included in the superimposed image is associated with the newly acquired first image.

9. The apparatus according to claim **8**, wherein the second input includes a third input for selecting the information piece included in the superimposed image and a fourth input for acquiring the new first image, and

the hardware processor is further configured to control the apparatus to select the information piece included in the superimposed image when receiving the third input, and then acquire the new first image and generate the association data piece in which the newly acquired first image is associated with the information piece selected in response to the third input when receiving the fourth input.

10. The apparatus according to claim **9**, wherein

the third input is an input according to an operation of detecting a pointing object in contact with a second area in which the information piece included in the superimposed image is displayed on a screen that includes an image area in which the superimposed image is displayed, and

the fourth input is an input according to an operation of detecting releasing of the pointing object from the screen.

11. The apparatus according to claim **10**, wherein, when the third input is received, the hardware processor is configured to control the apparatus to display the information piece included in the superimposed image so as to stick to the pointing object.

12. The apparatus according to claim **1**, wherein, when the acquired first image matches or is similar to a first image contained in association data written into the storage, and when, among the information pieces contained in the association data written into the storage, the information piece associated with a first image that matches or is similar to the acquired first image matches the acquired information piece, the hardware processor is configured to control the apparatus to not generate an association data piece.

13. The apparatus according to claim **1**, wherein

the hardware processor is configured to control the apparatus to display second images capable of identifying first images with which information pieces have already been associated, and

when receiving a second input for selecting any of the second images, the hardware processor is configured to control the apparatus to acquire the first image, and to generate an association data piece in which an information piece that corresponds to the second image that has been instructed to be selected is associated with the acquired first image.

14. An information processing method comprising:

acquiring, by a processor, a first image obtained by imaging;

acquiring, by the processor, any of multiple pieces of information capable of being associated with the first image;

generating, by the processor, an association data piece by associating the acquired first image with the acquired information piece when receiving a first input;

writing, by the processor, the generated association data piece into a storage unit; and

controlling, by the processor, of display of the first image and one or more pieces of the information, wherein

the first input is an input based on: receiving selection by a pointing object with respect to a first area of a screen that includes an image area in which the first image is displayed and an information area in which one or more pieces of the information are displayed; detecting moving of the pointing object to the image area and then detecting releasing of the pointing object; and

when receiving the first input,

acquiring the first image that is displayed on the screen when the pointing object is released, and

acquiring the information piece corresponding to the first area.

15. A computer program product comprising a non-transitory computer-readable medium containing a computer program embodied therein that, when executed, causes a computer to control an apparatus to at least:

acquire a first image obtained by imaging;

acquire any of multiple pieces of information capable of being associated with the first image;

receive a first input;

associate the acquired first image with the acquired information piece to generate an association data piece when the first input is received;

write the association data piece into storage; and

control display of the first image and one or more pieces of the information, wherein

the first input is an input based on: receiving selection by a pointing object with respect to a first area of a screen that includes an image area in which the first image is displayed and an information area in which one or more pieces of the information are displayed; detecting mov-

ing of the pointing object to the image area and then detecting releasing of the pointing object, and

when receiving the first input,

the first image that is displayed on the screen when the selection is released is acquired, and

the information piece corresponding to the first area is acquired.

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